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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/068,857	02/11/2002	Dominique Loubinoux	4068-040	8967

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EXAMINER	
AFTERGUT, JEFF H	
ART UNIT	**PAPER NUMBER**
1733	

DATE MAILED: 07/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/068,857	LOUBINOUX, DOMINIQUE	
	Examiner	Art Unit	
	Jeff H. Aftergut	1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *25 May 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *30,31,44,47,52 and 54-57* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *30, 31, 44-47, 52 and 54-57* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 30, 31, 44, 47, 52, and 54-57 are rejected under 35 U.S.C. 103(a) as being unpatentable over Middelman (US Patent 5,269,863, newly cited) in view of any one of O'Connor (U.S. Patent 4,800,113, of record) , NASA Tech Brief entitled "Solventless Fabrication of Reinforced Composites" (newly cited), U.K. Patent 2,190,041 (newly cited) or Curzio (U.S. Patent 4,539,249, of record) and optionally further taken with either one of Vane (US Patent 5,445,693, of record) or Matsuo et al (US Patent 5,989,710, newly cited).

Middelman suggested that it was known at the time the invention was made to form a composite sheet which included the steps of providing a first bundle of parallel threads moving unidirectionally in a first direction, placing a lap of threads on the surface of the moving bundle of threads with a weft insertion carriage (unit 8) in a single layer of continuous threads (see Figures 2, 4, and 6 and note column 3, lines 36-39, column 10, lines 3-6) which are oriented in a second direction transverse to the first direction to provide a combination of threads having a first layer comprising the moving bundle of threads and a second layer comprising the lap of threads. A second bundle of parallel threads moving in direction transverse to the first bundle of threads is applied to the opposite side of the first bundle of threads from the single layer of the lap of threads to provide in the following order a first layer of moving threads, a second layer of a lap of threads and a third layer of a second bundle of threads wherein the layers of threads

are separate and unconnected from one another. Subsequent to forming the specified fiber arrangement, the reference to Middelman suggested that those skilled in the art would have impregnated the fiber assembly with a thermoplastic resin matrix material with a metering device 15 subsequent to formation of the fiber assembly, see column 4, lines 33-40, column 8, lines 39-47. the reference taught that one skilled in the art would have subjected the impregnated laminate to a heating operation with pressure followed by allowing the assembly to cool, see column 8, lines 47-66. The reference taught that the fibers useful for the laminate included not only reinforcing fibers but also thermoplastic fibers, see column 4, lines 33-46. The reference also suggested that those skilled in the art would have formed the laminate from solely the first bundle of parallel threads, the lap of threads and the second bundle of parallel threads. The reference failed to expressly state that one skilled in the art would have avoided the use of the metering device for impregnation with the matrix material and instead employed a thermoplastic fiber with a lower melting point than a reinforcing fiber as the means for impregnation wherein the mixed fiber arrangement was used in the layers which made up the assembly.

However, rather than impregnation with a solvent or a melt of a thermoplastic, it was known at the time the invention was made to employ a blend of commingled fibers of thermoplastic low melting point material and reinforcing filaments together to form a composite article whereby subsequent to a heat treatment the thermoplastic filaments formed a matrix for the assembly in the composite article as taught by O'Connor, NASA Tech Brief, U.K. '041 or Curzio. More specifically, O'Connor NASA Tech Brief, U.K.

'041and Curzio suggested that it was known to form a composite article via an operation wherein the matrix material was introduced via a coating operation either as a melt of thermoplastic or a wet operation via a solvent coating operation. Each references suggested that such processing was disadvantageous in that the finished end product was stiff and difficult to handle in subsequent shaping operation as well as the problems associated with the impregnation itself which included solvent exposure as well as the cost associated with melting the thermoplastic materials. Each reference suggested that as an alternative one skilled in the art at the time the invention was made would have incorporated a thermoplastic filament with the reinforcing filament and contacted the same such as by commingling the fibers together whereby the hybrid blend of fibers was then processed into a composite after formation into a fabric material by laying, braiding, knitting and/or weaving (which appears to include non-woven manufacture). As it would have improved the handling of the composite material into an article during fabrication and as it would have eliminated the problems associated with melt impregnation as well as solvent impregnation of the reinforcing fibers with the thermoplastic, it would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a thermoplastic fiber with a reinforcing fiber in the formation of a thermoplastic fiber reinforced composite wherein the thermoplastic fiber provided the matrix material for the composite article as suggested by any one of O'Connor , NASA Tech Brief entitled "Solventless Fabrication of Reinforced Composites", U.K. Patent 2,190,041 or Curzio in the process of making a composite board as suggested by Middelman.

With respect to claim 31, note that the reference to Middelman suggested that one skilled in the art at the time the invention was made could apply additional layers of material to provide additional reinforcement (i.e. make a 5 layer assembly rather than a 3 layer assembly) and additionally applied copper foil onto the assembly in order to make a circuit board therein. Regarding claim 44, note that the reference to Middelman suggested that one skilled in the art would have applied heat and pressure to the assembly with a double band press. Additionally, note that the references to any one of O'Connor, NASA Tech Brief entitled "Solventless Fabrication of Reinforced Composites", U.K. Patent 2,190,041 or Curzio suggested that those skilled in the art would have applied heat and pressure as well as a subsequent cooling of the assembly when infiltrating the reinforcing fibers with the thermoplastic in the form of a fiber in the composite. Regarding claim 47, note that Middelman suggested that threads of organic material would have been suitable as the reinforcing fibers for the processing in the manufacture of the composite. Regarding claim 52, note that the references suggested that glass fibers would have been useful as the reinforcing fibers and that polypropylene would have been useful for the plastic fibers therein. Regarding claim 54, note that Middelman suggested that the fibers were continuous in the processing. Regarding claim 55, note that the references to any one of O'Connor, NASA Tech Brief entitled "Solventless Fabrication of Reinforced Composites", U.K. Patent 2,190,041 or Curzio suggested that one skilled in the art would have employed 40-80 percent reinforcing material in the composites formed according the processing therein. Regarding claims

56 and 57, note that Middelman suggested that the thickness of the finished sheet assembly would have been approximately 1.6 mm, see column 10, lines 38-42.

While it would have been obvious as expressed above to employ the thermoplastic in the form of a filament which was intermixed with the reinforcing fiber and then formed into the laid up fabric rather than impregnation of the fabric with the resin, the prior art did not expressly suggest that one would have known that the commingled fibers would have been suitable for lay down in the formation of a multilaxial fabric arrangement. However, such was well recognized in the art as a useful fabric forming technique in composite manufacture wherein one employed thermoplastic filaments and reinforcing filaments wherein the thermoplastic filaments made up part of the matrix in the finished assembly as suggested by Vane and Matsuo et al. either one of Vane or Matsuo et al suggested that those skilled in the art at the time the invention was made would have known to mix thermoplastic fibers and reinforcing fibers and to form the same into multi layer multidirection reinforced composite article by laying the blended fiber material at various angles within various layers to make a composite material. It would have been understood that the commingled fibers of any one of O'Connor , NASA Tech Brief entitled "Solventless Fabrication of Reinforced Composites", U.K. Patent 2,190,041 or Curzio would have been capable of processing in the manner described by Middelman for forming a multilayer multiaxially reinforced composite material as the references to either one of Vane or Matsuo et al suggested such processing. It would have been obvious to one of ordinary skill in the art at the time the invention was made to employ a thermoplastic fiber with a reinforcing fiber in

the formation of a thermoplastic fiber reinforced composite wherein the thermoplastic fiber provided the matrix material for the composite article as suggested by any one of O'Connor , NASA Tech Brief entitled "Solventless Fabrication of Reinforced Composites", U.K. Patent 2,190,041 or Curzio in the process of making a composite board as suggested by Middelman wherein one skilled in the art would have understood that the reinforcing fiber and thermoplastic fiber mixtures would have been suitable for fabric formation in accordance with the processing of Middelman as evidenced by Vane or Matsuo et al.

Response to Arguments

3. Applicant's arguments with respect to claims 30, 31, 44, 47, 52, and 54-57 have been considered but are moot in view of the new ground(s) of rejection.

The applicant argues that the Middelman reference taught that one skilled in the art would have utilized a layer of two plies thickness for the central layer rather than a single ply of fibers (a single layer of fibers) in the processing described in the reference. This has not been found to be persuasive because: (1) the claims at hand do not require that the first bundle of parallel threads be disposed as a single layer of continuous threads as argued by applicant but rather the lap of threads was defined as a single layer of continuous threads, and; (2) the reference to Middelman expressly suggested that the layer employed in the processing therein was either a single layer of threads or a double layer of threads as discussed above. One skilled in the art would have understood that Middelman envisioned the use of single or double layers for each of the layers described therein as discussed above.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff H. Aftergut whose telephone number is 571-272-1212. The examiner can normally be reached on Monday-Friday 7:15-345 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Richard Crispino can be reached on 571-272-1226. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Jeff H. Aftergut
Primary Examiner
Art Unit 1733

JHA
July 6, 2006